Particle dynamics in turbulent flows

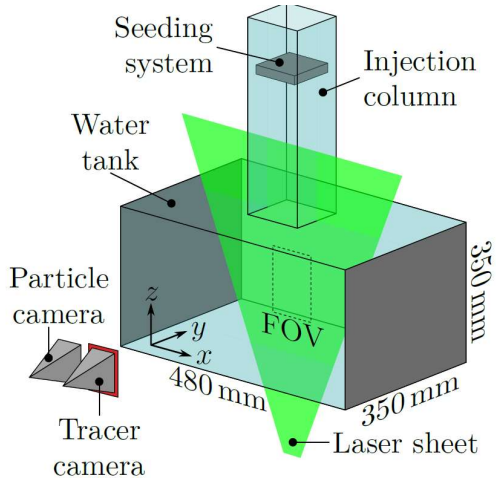
https://perso.ensta-paris.fr/~monchaux/PhD_particle_short.pdf

Inertial particle dynamics is the basis for understanding the formation of rain, the dispersion of pollutants or plankton, sedimentation in oceans or rivers and many other environmental and industrial issues.

Turbulent flows laden with inertial particles have striking features linked to the impact of turbulence on the particle dynamics: cluster formations, settling enhancement, collision alteration, that are the focus of a large number of experimental, numerical and theoretical studies. The back reaction particles exert on the carrier flow is much less studied, particularly experimentally since it requires simultaneous fluid and particle velocity field measurements.

This PhD work aims at studying both the couplings between particle and turbulent dynamics. We propose an experimental work on the dynamics of microparticles in a large scale turbulent flow. It consists in making both Eulerian measurements of the carrier fluid (turbulence) and Lagrangian measurements to resolve the dynamics of the particles and to understand the couplings between the two. Very few teams in the world are able to perform both measurements simultaneously, which puts us in an interesting position to tackle this issue experimentally.

Collaborations with CIEMAT (Madrid, Spain) and CMAP (Polytechnique, Palaiseau, France) are developed to perform simultaneously numerical simulations.



Experimental setup with double phase measurement system

Profile

Candidate should have strong background in fluid mechanics, dynamical systems and/or statistical physics. This job requires a strong taste for experimental work.

Application

CV and motivation letter to be sent to romain.monchaux@ensta-paris.fr